



**NOAA**  
**FISHERIES**

SEFSC

# **Data Use in HMS ICCAT Fishery Stock Assessments**

## SEFSC PROGRAM REVIEW

June, 2013

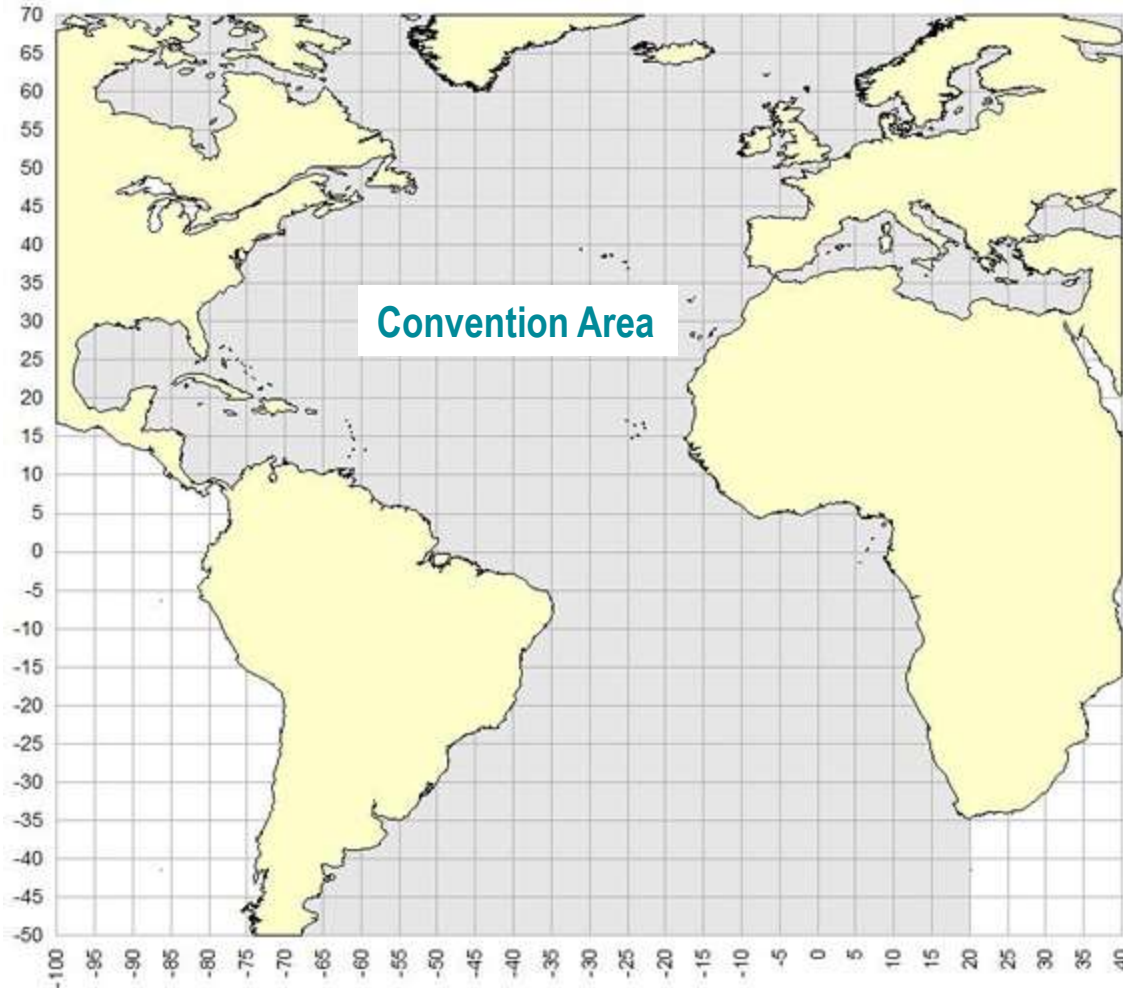
# Relevant Jurisdiction

- International *Convention* for the Conservation of Atlantic Tunas, Rio de Janeiro, 1966.
- International *Commission* for the Conservation of Atlantic Tunas (ICCAT), 1969
- Atlantic Tunas Convention Act, 1975 (*superceeds aspects of Magnuson–Stevens Fishery Conservation and Management Reauthorization Act of 2006*)



# ICCAT

## International Commission for the Conservation of Atlantic Tunas



- RFMO responsible for the conservation of tunas and tuna-like species (e.g. swordfish, billfish, pelagic sharks) in the Atlantic Ocean and adjacent seas
- Management advice provided by the Standing Committee on Research and Statistics (SCRS), consisting of scientific delegations from contracting parties
- SEFSC has lead role for U.S. scientific delegation

# Data richness: “moderate” to “poor”

Data deficiencies [Rec. 05-09]	CATCH DATA		EFFORT DATA	SIZE DATA	STANDARDIZED CPUE	BIOLOGY	ASSESSMENT Category
	IUU	UNC					
Stock							
SHK*	☹☹☹	☹☹☹	☹☹☹	☹☹☹	☹	☹☹☹	☹☹☹
ALB-MED	☹☹☹		☹☹☹	☹☹☹	☹☹☹	☹☹☹	☹☹☹
SMT	☹☹	☹☹	☹☹☹	☹☹☹	☹☹☹	☹☹	☹☹☹
BIL	☹☹	☹☹☹	☹☹	☹☹	☹☹	☹	☹☹☹
BFT-E-M	☹☹☹		☹☹	☹☹	☹	☹	☹☹☹
SWO-MED	☹	☹	☹	☹☹	☹☹	☹	☹☹☹
YFT					☹☹	☹	☹☹☹
BET	☹			☹	☹	☹	☹☹☹
SKJ					☹☹	☹	☹☹☹
ALB-ATL			☹	☹		☹	☹☹☹
BFT-W						☹	☹☹☹
SWO-ATL						☹	☹☹☹

Information  
Deficit  
Impedes  
Assessment

At best “data  
moderate”



# Stock Assessment Models Used

- Surplus Production models (e.g. tropical tunas, swordfish)
  - Bayesian (sharks)
- Catch-free age structured (sharks)
- Virtual Population Analysis (bluefin, yellowfin)
- Statistical catch at age/length (Stock Synthesis / Multifan-CL)
  - Blue and white marlin (SS), albacore and bigeye (MCL)
- Ecological risk assessment (sharks, sea turtles)

# U.S.A. Fishery Dependent Statistics

**Recreational Fisheries** (landings, discards, effort, size composition, catch per unit effort)

- MRIP (S&T)
- Large pelagic Survey (S&T) - *specifically designed to cover the HMS fishery (restricted to VA – ME, June – October)*
- Non-tournament billfish/swordfish call-in (S&T)
- Recreational Billfish Survey (SEFSC) – also includes tunas and swordfish
- Bluefin Specific Fishery Statistics

North Carolina and Maryland Catch Card Programs

Automated Landings Reporting System (Hdqtrs.)



# U.S.A. Fishery Dependent Statistics

## Commercial Fisheries (landings, discards, effort, size composition, catch per unit effort)

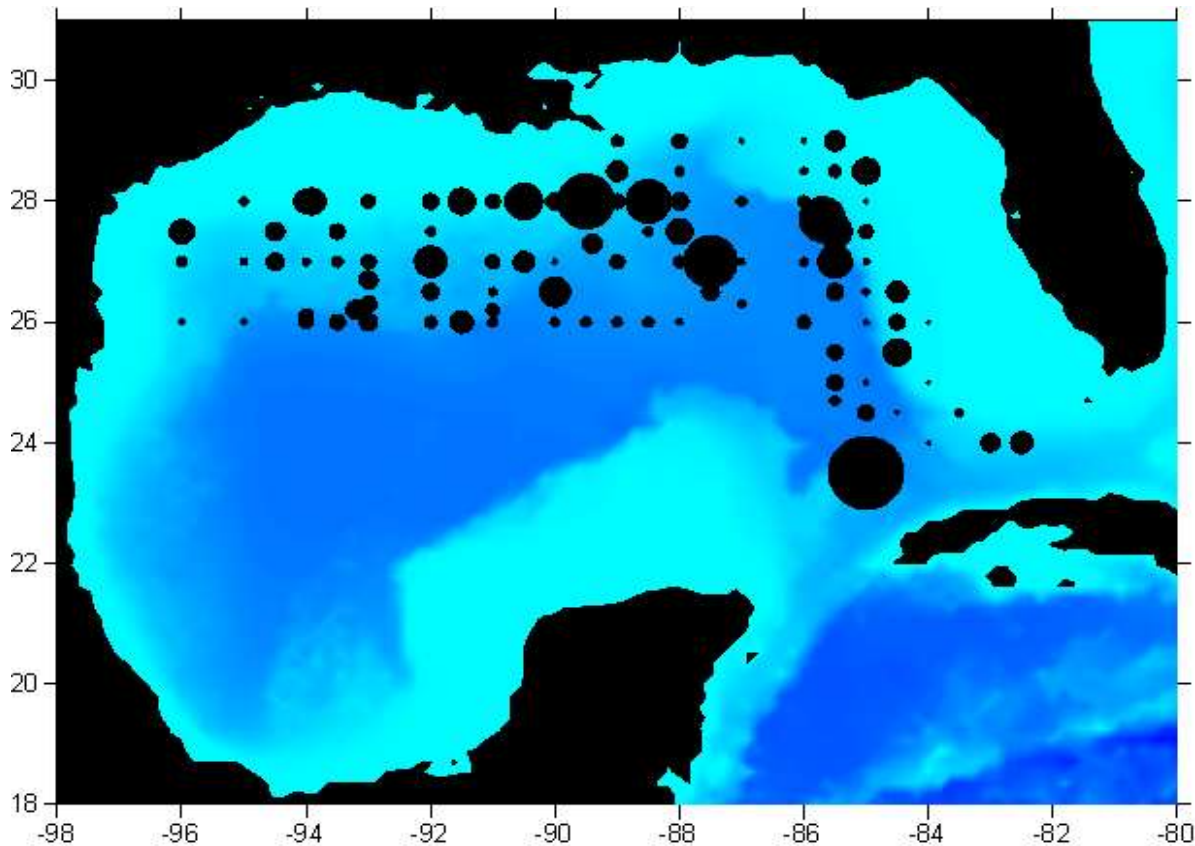
- HMS Electronic Dealer Reporting System (all except bluefin tuna)
- Atlantic Bluefin Tuna Dealer Landings Reports (Northeast Regional Office)
- Pelagic Observer Program (SEFSC): ~8% coverage (~50% during the bluefin tuna spawning season in Gulf of Mexico)
- Pelagic Longline Logbook Program (SEFSC): census, but less detailed than observer data and under-report discards





# Available Fishery Independent Statistics

- Bluefin tuna larval survey (1977- )



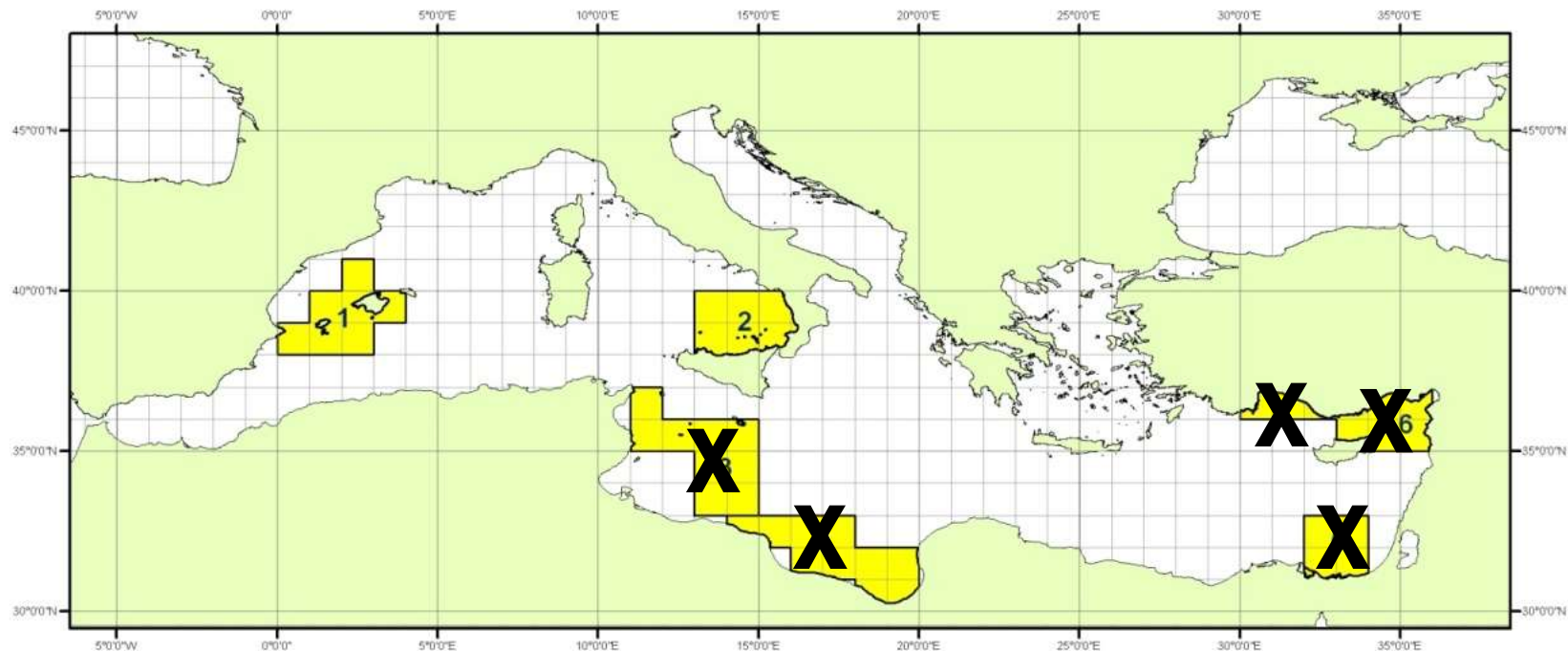


# Available Fishery Independent Statistics

- Aerial Surveys

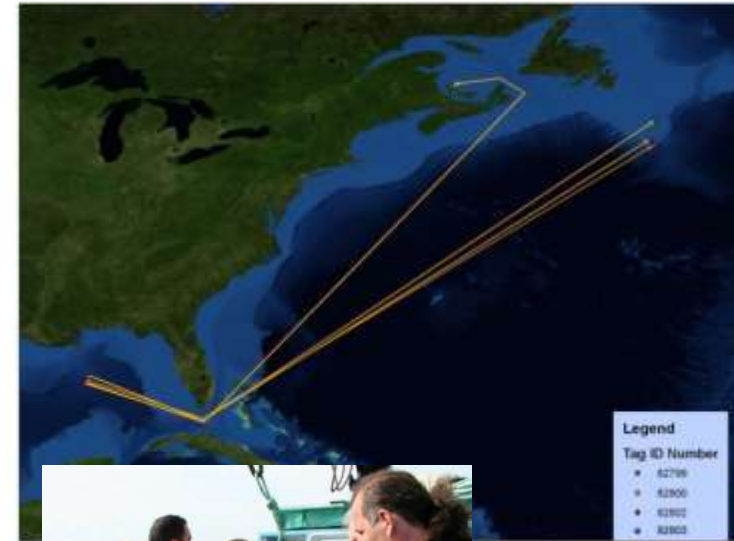


## ATLANTIC-WIDE RESEARCH PROGRAMME ON BLUEFIN TUNA (GBYP - 2010)



# Available Fishery Independent Statistics

- Electronic Tagging studies
  - post-release mortality
  - high resolution data on habitat use
  - movement patterns, stock structure
- Conventional Tagging studies
  - Bluefin tuna juveniles (LPRC)
  - ICCAT Atlantic-wide Bluefin Tuna Research Program



# Other data programs

## Bluefin tuna biological sampling (2010- )

- goal is comprehensive hard part sampling of the BFT commercial and recreational fisheries for developing stock/age/length keys
- Includes sampling through LPS, dealers, and collaboration with other scientists. Other tunas also sampled



# Other data programs

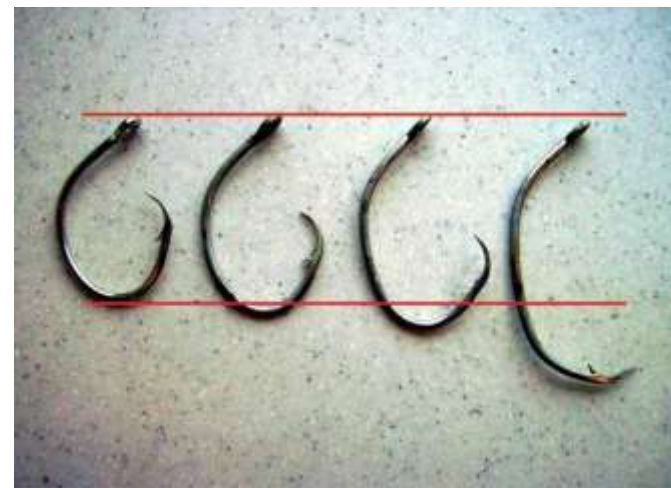
## Cooperative Tagging Center (constituent-based tagging)

- Interested parties provided free tagging kits on request
- Most useful for gross movement patterns and growth estimation
- Release information not always submitted (reduces the ability to estimate abundance, mortality, migration rates, and gear catchability)
- Variable rates of handling mortality (release mortality and post-release effects on survival)
- Variable rates of tag retention (unknown tag life and rates of tag loss)
- Quality of angler size estimates and measurements variable (can limit ability to estimate growth)

# Other data programs

## Bluefin tuna bycatch mitigation experiments

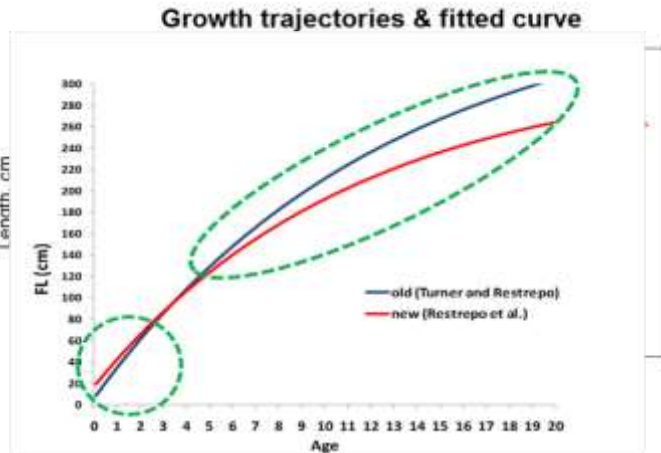
- Account for changes in catchability in the calculation of abundance indices
- Estimate post-release mortality rates for bluefin tuna



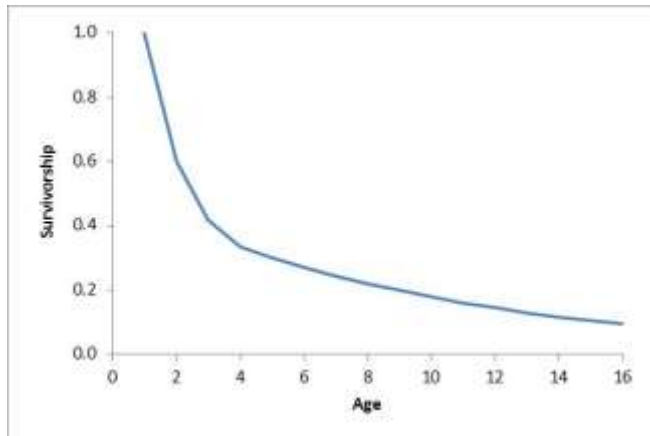


# Life history information

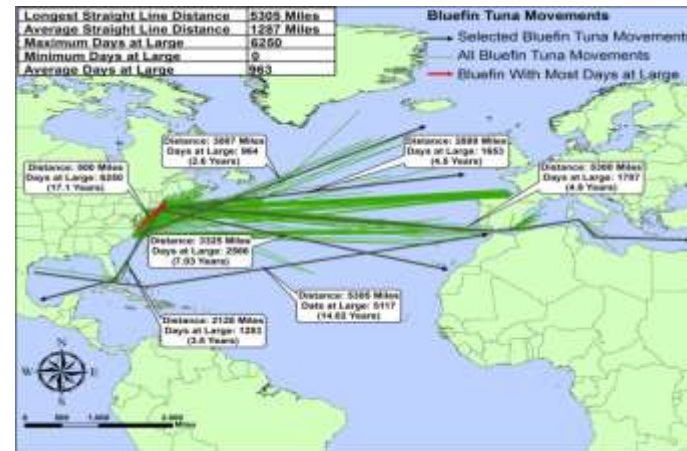
## Growth (size/weight at age)



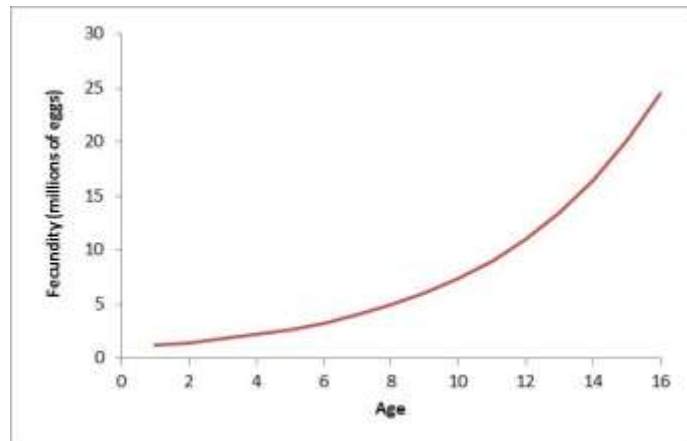
## Natural mortality



## Migration patterns (stock structure/mixing)



## Maturity (reproductive potential)

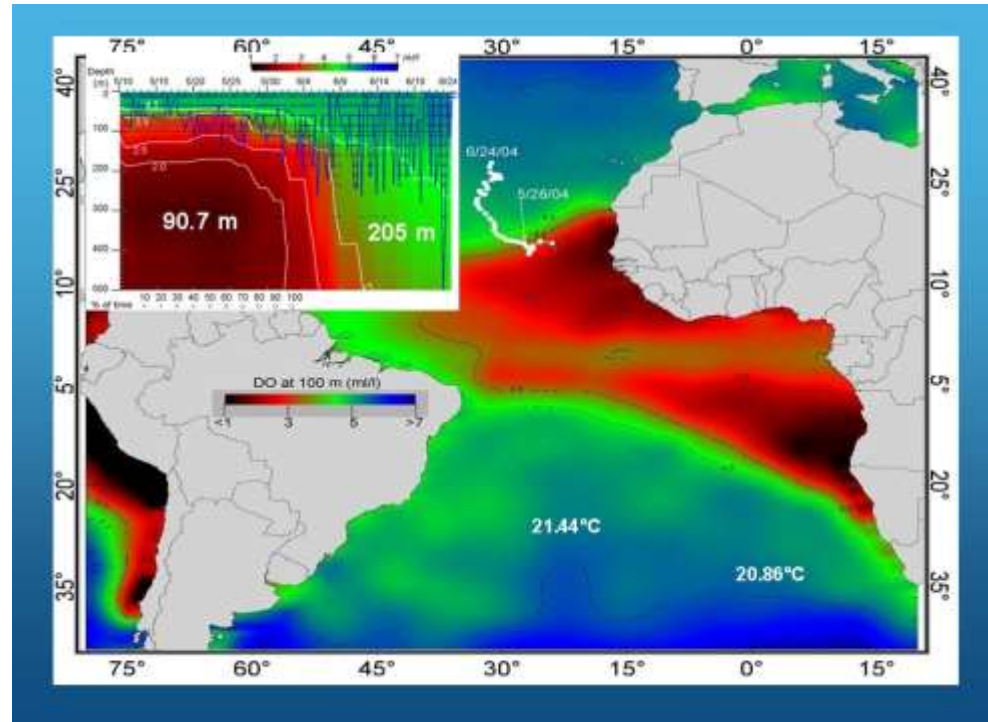




# Environmental covariates

Example: Habitat compression via expansion of the oxygen minimum zone

Aid in interpretation of catch rates of oxygen sensitive species



# Take home points

## Fishery-Independent (FI) data

- Larval survey (only bluefin tuna)

Link of larval-adult abundance is affected by many factors

Larval distribution is extremely patchy, and relatively few larvae are collected with the standard sampling technique (high CV)

- Aerial surveys

Good for species that spend time near surface like bluefin tuna

Expensive and hard to coordinate on international scale

- Tagging surveys

Need scientific design, expensive



# Take home points

## Fishery data

- No age composition data (length composition sometimes converted to age using growth curves – cohort slicing)
- Recreational statistics imprecise owing to low coverage levels, lack of specificity to HMS (with the exception of the LPS), accessibility
- U.S. pelagic longline, the accuracy and precision of dead discard estimates is poor where observer coverage is low. Discards from other fisheries are self-reported or not estimated at all.
- U.S., billfish removals are currently estimated from RBS reported tournament landings, and self-reported call-in information (probably biased low)
- Catch composition (sex, stock origin, even species may not be identified – esp. sharks and white marlin/roundscale spearfish)

# Take home points

## Fishery CPUE

- Heavy dependence for HMS species owing to expense and difficulty coordinating fishery-independent surveys on basin scale
- Typically low observation error in commercial data sets (many sets), but moderate to high observations error in rod and reel surveys (cluster sampling)
- High potential process error owing to changes in species targeted, fishing methods, regulations, low spatial coverage (relative to stock distribution)

